

CLAIMS

What is claimed is:

1. A method implemented in a network file server for providing a trunk, the trunk including a plurality of communications ports comprising the steps of:
 - 5 assigning ownership of the plurality of communications ports coupled to a switch to a virtual network device;
 - setting a trunk network address to a first network address assigned to a first communications port;
 - 10 setting network addresses for the plurality of communications ports and a virtual network address assigned to the virtual network address to the trunk network address; and
 - upon receiving a data packet for the trunk network address by any of the communications ports in the trunk, forwarding the data packet to the virtual network device.
- 15 2. The method as claimed in Claim 1 further comprising the step of:
 - allocating a plurality of device structures, the device structures allocated for each of the plurality of communications ports, each device structure including an owner field.
- 20 3. The method as claimed in Claim 2 wherein the step of assigning comprises the step of:
 - storing a pointer to a device structure allocated for the virtual network device in the owner field in each of the device structures allocated for the plurality of communications ports.

4. The method as claimed in Claim 3 wherein the step of forwarding comprises the step of:
 - examining the contents of the owner field in the device structure allocated to the communications port receiving the data packet; and
 - 5 selecting the virtual device pointed to by the pointer stored in the owner field.
5. The method as claimed in Claim 1 further comprising the step of:
 - upon receiving a data packet, by the virtual network device to be
 - 10 transmitted to the trunk, transmitting the data packet through one of the plurality of communications ports.
6. The method as claimed in Claim 5 further comprising the step of:
 - selecting the one of the plurality of communications ports dependent on the result of an exclusive OR operation on a portion of a source network address
 - 15 and a destination network address.
7. The method as claimed in Claim 6 wherein the portion of the source network address and the destination network address are dependent on a number of communications ports in the trunk.
8. The method as claimed in Claim 1 wherein the trunk network address is a data
- 20 link layer address.
9. The method as claimed in Claim 8 wherein the data link layer address is an Ethernet address.
10. The method as claimed in Claim 8 wherein the data link layer address is an IEEE 802.3 address.

11. The method as claimed in Claim 10 further comprising the steps of:
- assigning ownership of a second plurality of communications ports coupled to a second switch to a second virtual network device;
 - assigning ownership of the virtual network device and the second virtual network device to a third virtual network device;
 - setting a failsafe network device address to the trunk network address;
 - setting network addresses assigned to the plurality of communications ports to the third network address and a virtual network address assigned to the virtual network address to the failsafe network device address; and
 - upon receiving a data packet for the failsafe network device address by any of the communications ports, forwarding the data packet to the third virtual network device.
12. A network file server comprising:
- a plurality of communications ports coupled to a switch;
 - a trunk configuration routine which creates a virtual device for the plurality of communications ports, sets a trunk network address to a first network address assigned to a first communications port and sets network addresses for the plurality of communications ports and a virtual network address assigned to the virtual network address to the trunk network address;
 - and
 - an owner routine which selects a virtual device associated with the trunk network device for a data packet for the trunk network address received by any of the communications ports in the trunk.
13. The network file server as claimed in Claim 12 further comprising:
- a device driver which allocates a device structure for each of the plurality of communications ports, each device structure including an owner field.

14. The network file server as claimed in Claim 13 wherein the trunk configuration routine allocates a device structure for the virtual device and stores a pointer to the device structure allocated for the virtual network device in the owner field in
5 each of the device structures allocated for the plurality of communications ports.
15. The network file server as claimed in Claim 14 wherein the owner routine examines the contents of the owner field in the device structure allocated to the communications port receiving the data packet and selects the virtual device pointed to by the pointer stored in the owner field.
- 10 16. The network file server as claimed in Claim 12 further comprising:
a virtual device driver which selects one of the plurality of communications ports through which to transmit a data packet on the trunk.
- 15 17. The network file server as claimed in Claim 16 wherein the virtual device driver selects the one of the plurality of communications ports dependent on the result of an exclusive OR operation on a portion of a source network address and a destination network address.
18. The network file server as claimed in Claim 17 wherein the portion of the source network address and the destination network address are dependent on a number of communications ports in the trunk.
- 20 19. The network file server as claimed in Claim 12 wherein the trunk network address is a data link layer address.
20. The network file server as claimed in Claim 16 wherein the data link layer address is an Ethernet address.

21. The network file server as claimed in Claim 20 wherein the data link layer address is an IEEE 802.3 address.
22. The network file server as claimed in Claim 21 wherein the configuration routine assigns ownership of a second plurality of communications ports
5 coupled to a second switch to a second virtual network device and ownership of the virtual network device and the second virtual network device to a third virtual network device and sets a failsafe network device address to the trunk network address and sets network addresses assigned to the plurality of communications ports to the third network address and a virtual network
10 address assigned to the virtual network address to the failsafe network device address and the owner routine selects the third virtual network device associated with the failsafe network device for a data packet for the failsafe network device address received by any of the communications ports.
23. A computer program product for providing a trunk, the trunk including a
15 plurality of communications ports, the computer program product comprising a computer usable medium having computer readable program code thereon, including program code which:
- assigns ownership of the plurality of communications ports to a virtual network device;
- 20 sets a trunk network address to a first network address assigned to a first communications port;
- sets network addresses for the plurality of communications ports and a virtual network address assigned to the virtual network address to the trunk network address; and
- 25 upon receiving a data packet for the trunk network address by any of the communications ports, forwards the data packet to the virtual network device.

24. A network file server comprising:

a plurality of communications ports coupled to a switch;

means for providing a trunk including the plurality of communications ports by assigning ownership of the plurality of communications ports to a virtual network device;

means for setting a trunk network address to a first network address assigned to a first communications port and for setting network addresses for the plurality of communications ports and a virtual network address assigned to the virtual network address to the trunk network address; and

means for forwarding the data packet a received data packet for the trunk network address by any of the communications ports in the trunk to the virtual network device.

25. The network file server as claimed in Claim 24 further comprising:

means for allocating a plurality of device structures, the device structures allocated for each of the plurality of communications ports, each device structure including an owner field.

26. The network file server as claimed in Claim 25 wherein the trunk configuration routine further comprises:

means for storing a pointer to a device structure allocated for the virtual network device in the owner field in each of the device structures allocated for the plurality of communications ports.

27. The network file server as claimed in Claim 26 wherein the means for forwarding further comprises:

means for examining the contents of the owner field in the device structure allocated to the communications port receiving the data packet; and

means for selecting the virtual device pointed to by the pointer stored in the owner field.

28. The network file server as claimed in Claim 24 further comprising:
upon receiving a data packet, by the virtual network device to be
5 transmitted to the trunk, means for transmitting the data packet through one of
the plurality of communications ports.
29. The method as claimed in Claim 28 wherein the means for transmitting
selects the one of the plurality of communications ports dependent on the
result of an exclusive OR operation on a portion of a source network address
10 and a destination network address.
30. The network file server as claimed in Claim 29 wherein the portion of the
source network address and the destination network address are dependent on a
number of communications ports in the trunk.
31. The network file server as claimed in Claim 24 wherein the trunk network
15 address is a data link layer address.
32. The network file server as claimed in Claim 32 wherein the data link layer
address is an Ethernet address.
33. The network file server as claimed in Claim 32 wherein the data link layer
address is an IEEE 802.3 address.
- 20 34. The network file server as claimed in Claim 24 further comprising:
a second plurality of communications ports coupled to a second switch
wherein the means for providing provides a second trunk including the second

plurality of communications ports by assigning ownership of the second
plurality of communications ports to a second virtual network device, the means
for assigning assigns ownership of the virtual network device and the second
virtual network device to a third virtual network device, the means for setting
5 sets a failsafe network device address to the trunk network address and sets
network addresses assigned to the plurality of communications ports to the third
network address and a virtual network address assigned to the virtual network
address to the failsafe network device address and means for forwarding
forwards a received data packet for the failsafe network device address by any of
10 the communications ports to the third virtual network device.

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